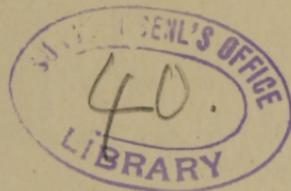


Dalton (J. C.)

Anatomy of the  
Placenta

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A N A T O M Y  
OF  
THE PLACENTA.

BY  
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The object of the present paper is to demonstrate, by positive evidence, some points in the anatomy of the placenta which are still in dispute. It is more particularly with regard to the precise mode of vascular connection existing between the placenta and the uterus, that there are some discrepancies among the anatomists of the present day; and I shall now ask the attention of the Academy to the result of certain experiments which I have recently performed, and which seem to leave no doubt with regard to the real nature of this connection.

Ever since the time of the Hunters, it has been believed by many that the blood-vessels of the uterus were directly prolonged into the substance of the placenta. William Hunter, with the assistance of his brother John, injected, in several instances, the vessels of the pregnant uterus with wax, and found, that although none of the injection passed into the vessels of the umbilical cord, it nevertheless found its way freely into the interior of the placenta. To use his own words, "the cells or interstices in the spongy portion of the pla-

centa were universally loaded with wax; either the blue, which was injected into the veins of the womb, or the red, which was thrown into the arteries."

He also says: "Most of the wax, which was first injected by the veins of the womb, was driven on toward the internal surface (of the placenta); and the red wax, which was afterward injected by the arteries, was lodged, principally, in the outer parts; but the two colors were more or less blended through the whole."

These injections are represented in Hunter's plates of the gravid human uterus, number five and number twenty-four.

In 1833, Mr. Mayo and Mr. Stanley, of London, examined some of Hunter's injected preparations of the placenta, preserved in the Museum of the Royal College of Surgeons, and made a report of their examination in the *London Lancet* for June 22d of the same year. They found that the umbilical arteries had been injected in yellow, the uterine arteries in red, and the uterine veins in black; and that the injection of the uterine vessels had evidently passed into the whole thickness of the placenta.

About the year 1832, Prof. Weber, of Leipzig, also made a double injection of the uterus and placenta, filling the substance of the placenta with colored wax from the uterine vessels. This specimen is still preserved in Prof. Weber's Museum, connected with the Medical School of Leipzig.

The above are the only instances, so far as I am aware, in which such injections have been made, since the commencement of the present century. They led to the belief, among a certain number of the profession, that the maternal and fetal vessels were intermingled in the placenta—the injection in both instances being supposed to have followed the natural course of the blood. They were not, however, universally regarded as conclusive, and very different views have been since maintained on this point by men of the first eminence in the profession.

Dr. Robert Lee, in the *London Lancet* for April 20th, 1833, published an account of some dissections which he made of pregnant uteruses under water, from which he derives the conclusion that there is no such penetration of the uterine vessels into the placenta, imagined by the Hunters and by Prof. Weber. He regards the filling of the placenta in these instances by the wax injection as entirely an effect of extravasation; and maintains that the sinuses of the uterus do not penetrate beyond the uterine or decidual surface of the placenta.

"When air," he says, "is forcibly thrown either into the spermatic

arteries or veins, the whole inner membrane of the uterus is raised by it; but none of the air passes across the deciduous membrane into the placenta, nor does it escape from the semilunar openings in the inner membrane of the uterus, until the attachment of the deciduous membrane to the uterus is destroyed. There are no openings in the deciduous membrane corresponding with those valvular apertures now described in the internal membrane of the uterus."

I would ask attention more particularly to the above statements of Dr. Lee, as to the non-injection of air from the uterus to the placenta, since they are in direct opposition with the results of my own experiments, to be described presently.

Dr. Lee goes on to say, "the facts which have now been stated warrant, I think, the conclusion that the human placenta does not consist of two parts, maternal and fœtal; that no cells exist in its substance, and that there is no communication between the uterus and the placenta by large arteries and veins."

Dr. John Reid, on the other hand, in 1841 published\* an elaborate account of the dissection of a pregnant uterus, with the placenta attached, in which he comes to an opposite conclusion, and maintains that the uterine vessels not only penetrate into the placenta, but extend throughout its entire thickness, enveloping everywhere the fœtal tufts. He was first led to adopt this view, by noticing that some of the placental tufts extended entirely through the decidual surfaces of the placenta, and projected more or less into the sinuses in the muscular walls of the uterus. No injection was practised by Dr. Reid, excepting that of the umbilical arteries, for the purpose of ascertaining the arrangement of vessels in the fœtal tufts, and his conclusions with regard to the disposition of the maternal sinuses on the placenta were derived altogether from careful dissection. He accordingly speaks of his results with a considerable degree of confidence, though not, as we shall see, with absolute certainty.

"The outer surface of the placental vessels," he says, "has a smooth appearance, and they are, *we may suppose*, everywhere enveloped in the inner coat of the vascular system of the mother, which, as we have seen above, is reflected upon them." "The interior of the placenta is thus composed of numerous trunks and branches, (each including an artery and an accompanying vein,) every one of which, we believe, is closely ensheathed in prolongations of the inner coat of the vascular system of the mother, *or at least in a membrane continuous with it*. If we adopt this view of the structure of the placenta," he

\* Edinburgh Medical and Surgical Journal, January, 1841.

goes on to say, "the inner coat of the vascular system of the mother is prolonged over each individual tuft, so that when the blood of the mother flows into the placenta through the curling arteries of the uterus, it passes into a large sac formed by the inner coat of the vascular system of the mother, which is intersected in many thousands of different directions, by the placental tufts projecting into it like fringes, and pushing its thin wall before them in the form of sheaths, which closely envelope both the trunk and each individual branch comprising these tufts. From this sac the maternal blood is returned by the utero-placental veins without having been extravasated or without having left her own system of vessels."

In 1845, Prof. John Goodsir, of Edinburgh, corroborated Dr. Reid's views, by the results of microscopic examination of the substance of the placenta and decidual membrane;\* and since that time these views have been received with more general favor by the profession than those of an opposite character.

Very recently, however, they have been again denied *in toto* by an observer of at least equal eminence with those already mentioned. M. Ch. Robin, of Paris, has published in the first number of the *Journal of Physiology*, conducted by M. Brown-Séguard, a paper entitled *Anatomy and Physiology of the Uterine Mucous Membrane, and its Epithelium during Gestation*, in which he maintains that the maternal sinuses cease at the uterine surface of the placenta, and do not penetrate into its substance. "There are no other utero-placental vessels existing," he says, "than those which are contained in the folds or processes of the uterine mucous membrane dipping down, in the mammalian animals above mentioned, into the spaces between the villosities of the chorion; and in the human subject, into the shallow furrows between the lobules of the placenta."

M. Robin also attributes, like Dr. Lee, all the instances of injections of the placenta from the uterine vessels to a rupture of the latter and consequent extravasation, the ruptures being, as he says, easily detected where they exist.

M. Robin occupies, as I have already intimated, the very first rank among physiologists and minute anatomists at the present day. I do not say this for the purpose of adding anything to his reputation, but merely in order to show that I appreciate fully the weight of his opinion, and that I should not maintain views directly opposed to his, as I shall do in the present paper, without having been personally convinced upon testimony of the most complete and satisfactory nature.

\* *British and Foreign Medical Review*, October, 1845.

I feel confident, indeed, from the facts which I shall immediately mention, that the blood-vessels of the uterus *do* really penetrate into the substance of the placenta, as supposed by the Hunters, Dr. Reid, and Prof. Goodsir, and that they constitute, with the tufts of the foetal chorion, an equal part of its mass.

The placenta is, therefore, a double organ, partly maternal and partly foetal; and, in order to arrive at a distinct understanding of the arrangement of its vessels, I will first go through with a hasty description of the development of the two structures which enter principally into its formation, viz: First, the chorion of the foetus, and secondly, the decidual membrane of the uterus.

I.—*Of the Chorion.* The external investing membrane of the egg as it comes from the ovary, is at first perfectly smooth. But after the formation of the chorion, and particularly after the blood-vessels of the allantois begin to extend into it, it becomes shaggy. Its exterior is seen to be covered with little transparent prominences, like so many villi, which increase the extent of its surface, and assist in the absorption of fluids from without. The villi are, at this time, quite simple in form, and homogeneous in structure.

As the egg increases in size, these villi rapidly elongate, and become, at the same time, divided and ramified by the repeated budding and sprouting of lateral off-shoots from every part. After this process of growth has gone on for some time, the external surface of the chorion presents a uniformly velvety or shaggy appearance, owing to its being covered everywhere with these tufted and compound villosities.

The villosities themselves, when examined by the microscope, have an exceedingly well-marked and characteristic appearance. They originate from the surface of the chorion by a somewhat narrow stem, and divide into a multitude of secondary and tertiary branches of varying size and figure; some of them slender and filamentous, others club-shaped, many of them irregularly swollen at various points. All of them terminate by rounded extremities, giving to the whole tuft a certain resemblance under the microscope to some kinds of sea-weed. The larger trunks and branches of the villosity are seen to contain numerous rounded or oval nuclei, imbedded in a nearly homogeneous or finely granular substratum. The smaller villosities appear, under a low magnifying power, simply granular in texture.

While the villosities just described are in process of formation, the allantois itself has completed its growth, and has become converted into a permanent chorion. The blood-vessels coming from the umbil-

ical arteries accordingly ramify over the chorion, and supply it with a tolerably abundant vascular net-work. These vessels penetrate also into the substance of the villosities. They enter the base or stem of each tuft, and, following every division of its compound ramification, they reach, at last, its rounded extremities. Here they turn upon themselves in loops, and retrace their course, to unite finally with the venous branches which empty into the umbilical vein.

Afterward, the chorion, which is, at the period above described, uniformly villous, shaggy, and vascular, becomes, in the progress of its development, partially bald. This change, which begins to take place about the end of the second month, commences at a point opposite the situation of the fœtus—and the insertion of the umbilical cord. The villosities in this region cease growing, and as the entire egg continues to enlarge, the villosities at the point indicated fail to keep pace with its growth and with the progressive expansion of the chorion. They accordingly become, at this point, thinner and more scattered, leaving that part of the surface of the chorion comparatively smooth and bald. This baldness increases in extent, and becomes more and more complete, spreading and advancing over the adjacent portions of the chorion, until at least two-thirds of its surface have become nearly or quite destitute of villosities.

At the opposite portion of the egg, at the same time, that portion, namely, which corresponds with the insertion of the umbilical cord, the villosities, instead of becoming atrophied, continue to grow, and this part of the chorion becomes constantly more shaggy and thickly set than before. The consequence is, that the chorion afterward presents a very different appearance at different portions of its surface. The greater part is smooth, but a certain portion, constituting about one-third of the whole, is covered with a soft and spongy mass of long, thickly set, compound villosities. It is this thickened and shaggy portion which is afterward concerned in the formation of the placenta; while the remaining smooth portion continues to be known under the name of the chorion.

The vascularity of the chorion keeps pace in its different parts respectively with the atrophy and development of its villosities. As the villosities shrivel and disappear over a part of its extent, the looped capillary vessels, which they at first contained, disappear also, so that the smooth portion of the chorion shows afterwards only a few straggling vessels running over its surface, and does not contain any abundant capillary plexus. In the thickened portion, on the other hand, the vessels lengthen and ramify to an extent corresponding with the

villosities in which they are situated. The umbilical arteries, coming from the abdomen of the fœtus, enter the villi and penetrate through their whole extent, forming at the placental portion of the chorion a mass of tufted and ramified vascular loops; while over the rest of the membrane they are merely distributed as a few single and scattered vessels.

II.—*Of the Decidua.* The decidua, which constitutes at first the remaining portion of the placenta, is nothing more than the mucous membrane of the body of the uterus. This membrane in the unimpregnated condition is soft and delicate in texture, and presents a smooth and slightly vascular internal surface. It consists throughout of minute glandular tubules, ranged side by side, and running perpendicularly to the free surface of the mucous membrane, occupying its entire thickness, and resting by their rounded extremities upon the subjacent muscular tissues; while their mouths open into the cavity of the uterus. A few fine blood-vessels penetrate the mucous membrane from below, and, running upward between the tubules, encircle their superficial extremities with a capillary net-work. There is no areolar tissue in the uterine mucous membrane, but only a small quantity of spindle-shaped fibro-plastic fibres, scattered between the tubules.

As the fecundated egg is about to descend into the cavity of the uterus, the mucous membrane, just described, takes on an increased activity of growth. It becomes tumefied and congested; and as it increases in thickness, it projects in rounded eminences or convolutions into the uterine cavity. The tubules increase in size, and the blood-vessels of the mucous membrane at the same time enlarge and multiply, and inosculate freely with each other; so that the vascular net-work encircling the tubules becomes more extensive and abundant.

The internal surface of the uterus, therefore, after this process has been for some time going on, presents a thick, rich, soft, vascular and velvety lining, which is the decidua, and which is thrown into abundant projecting folds and convolutions.

As the fecundated egg, in its journey from above downward, passes the lower orifice of the fallopian tube, it insinuates itself between the opposite surfaces of the uterine mucous membrane, and becomes soon afterwards lodged in one of the furrows or depressions between the projecting convolutions of the decidua. It is at this situation that an adhesion will subsequently take place between the external membrane of the egg on the one hand, and the uterine decidua on the other. At the point where the egg becomes fixed and entangled in this manner, a still more rapid development than before takes place in the uterine

mucous membrane. Its projecting folds begin to grow up around the egg, and enveloping it more and more, at last close together over its most prominent portion, enclosing it in this way in the decidua reflexa.

Let us now see in what manner the egg becomes attached to the decidual membrane. While the changes just noticed are taking place in the walls of the uterus, the growth of the egg and the development of the chorion have been going on simultaneously. The projecting filaments or villosities of the chorion, which are at first solid and non-vascular, insinuate themselves as they grow, either into the uterine tubules or between the folds of the decidual surface with which the egg is in contact, penetrating in this way into little cavities or follicles of the uterine mucous membrane. When the formation of the decidua reflexa is completed, the chorion has already become uniformly shaggy, and its villosities, spreading in all directions from its external surface, penetrate everywhere into the follicles just described. In this way the egg becomes entangled with the decidua—both decidua vera and decidua reflexa, throughout the whole extent of its surface.

Soon afterward the umbilical vessels, which emerge from the body of the foetus to ramify in the chorion, penetrate everywhere into the villosities of that membrane, and become fully developed. Each villosity of the chorion then, as it lies imbedded in its uterine follicle, contains a vascular loop, through which the foetal blood circulates, increasing in this way the activity of absorption and exhalation.

Subsequently, as we have seen, these vascular tufts, which are at first uniformly abundant throughout the whole extent of the chorion, disappear over a portion of its surface; while at the same time they become concentrated, and still further developed at a particular spot, the situation of the future placenta. This is the spot at which the egg is in contact with the decidua vera. Here, therefore, both the decidual membrane and the tufts of the chorion continue to increase in thickness and vascularity; while elsewhere, over the prominent portion of the egg, the chorion not only becomes bare of villosities and comparatively destitute of vessels, but the decidua reflexa, which is in contact with it, also loses its activity of growth, and becomes expanded into a thin layer, nearly destitute of vessels, and without any remaining trace of tubules or follicles.

The placenta accordingly is formed by the continued growth at one particular spot of the villi of the chorion, and the follicles of the decidua. The uterine follicle, into which the villus has penetrated, enlarges to a similar extent with the latter, sending out branching diverticula, corresponding with the multiplied ramifications of the villus. In fact,

the growth of the follicle and that of the villus go on simultaneously, and keep pace with each other; the latter constantly advancing as the cavity of the former enlarges.

But it is not only the *follicles* of the uterine mucous membrane which increase in size at this period. The capillary blood-vessels, which lie between them and ramify over their exterior, also become unusually developed. They enlarge and inosculate more freely with each other, so that every uterine follicle is soon covered with an abundant network of dilated capillaries, derived from the blood-vessels of the original decidua. At this time, therefore, each vascular loop of the foetal chorion is covered first with a layer forming the wall of the villus. This is in contact with the lining membrane of the uterine follicle, and outside of this again are the capillary vessels of the uterine mucous membrane; so that two distinct membranes intervene between the walls of the foetal capillaries on the one hand, and those of the maternal capillaries on the other; and all transudation must take place not only through the walls of the vessels, but also through the substance of these two membranes intervening between them.

As the formation of the placenta goes on, the general anatomical arrangement of the foetal vessels remains the same. These vessels continue to form vascular loops, penetrating deeply into the substance of the decidua; only they become constantly more elongated, and their ramifications more abundant and tortuous.

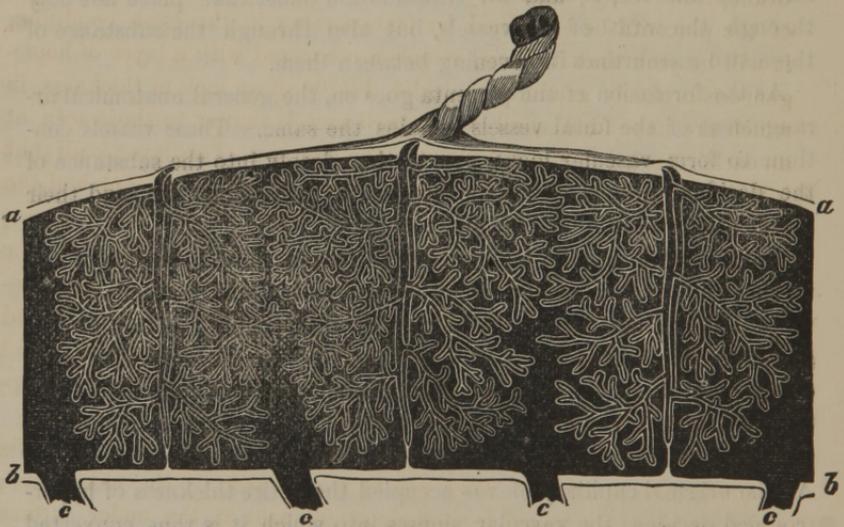
The maternal capillaries, however, situated on the outside of the uterine follicles, become considerably altered in their anatomical relations. They enlarge excessively, and, by encroaching constantly upon the little islets or spaces between them, fuse successively with each other; and, losing gradually in this manner the characters of a capillary network, become dilated into wide sinuses, which communicate freely with the enlarged vessels of the muscular walls of the uterus. As the original capillary plexus occupied the entire thickness of hypertrophied decidua, the vascular sinuses into which it is thus converted are equally extensive. They commence at the inferior surface of the placenta, where it is in contact with the muscular walls of the uterus, and extend through its whole thickness, quite up to the surface of the foetal chorion.

As the maternal sinuses grow upward, the vascular tufts of the chorion grow downward, and extend also through the entire thickness of the placenta. At this period the development of the blood-vessels, both in the foetal and maternal portions of the placenta, becomes so extensive that all the other tissues which originally co-existed with

them fall into a retrograde condition, and disappear almost altogether. The villousities of the chorion are now hardly anything more than ramified and tortuous vascular loops; the remaining substance of the villus having been atrophied and absorbed in the excessive growth of the blood-vessels. The uterine follicles have at the same time lost all trace of their original structure, and have become mere vascular sinuses, into which the tufted foetal blood-vessels project, with all their compound divisions and ramifications.

Finally, the walls of the foetal blood-vessels having come into close contact with those of the maternal sinuses, become adherent to them and fuse with their substance, so that the two can no longer be separated without lacerating either the one or the other, owing to this secondary union and adhesion which has taken place between them.

The placenta, then, when perfectly formed, has the following structure:



At *a.a.* is seen the chorion receiving the umbilical vessels from the body of the foetus through the umbilical cord, and sending out its compound and ramified vascular tufts into the substance of the placenta. At *b.b.* is the attached surface of the decidua, or uterine mucous membrane; and at *c.c.c.c.* are the orifices of uterine vessels which penetrate it from below. These vessels enter the placenta in an extremely oblique direction, though they are represented in the diagram, for the sake of distinctness, as nearly perpendicular. When they have once penetrated, however, the lower portion of the decidua, they immediately dilate into the placental sinuses, which extend through the en-

ture thickness of the organ, closely embracing all the ramifications of the foetal tufts.

The placenta, accordingly, when arrived at this stage of development, is composed essentially of nothing but blood-vessels. No other tissues enter into its structure; for all those which it originally contained have disappeared, excepting the blood-vessels of the foetus, entangled with and adherent to the blood-vessels of the mother.

There is, of course, no direct communication between the cavities of the maternal and foetal vessels. The blood of the foetus is always separated from the blood of the mother by a membrane which has resulted from the union and successive fusion of four different membranes, as already described, viz: first, the membrane of the foetal villus; secondly, that of the uterine follicle; thirdly, the wall of the foetal blood-vessels; and fourthly, the wall of the uterine sinus. This membrane, however, is extremely thin. If a villus from the foetal portion of the placenta be examined by transparency in the fresh condition, it will be seen that its blood-vessels are covered with a layer of homogeneous or finely granular material, 1-3500 of an inch in thickness, in which are imbedded small oval-shaped nuclei, similar to those seen at an earlier period in the villosities of the chorion. This layer is all that intervenes between the foetal blood in the tufts of the chorion and the maternal blood in the placental sinuses. It is of enormous extent, owing to the extremely abundant branching and subdivision of the double vascular system which is thus formed. The vascular tufts, accordingly, in which the blood of the foetus circulates, are bathed everywhere in the placental sinuses with the blood of the mother; and the processes of endosmosis and exosmosis of exhalation and absorption may go on between the two with the greatest possible activity.

It is very easy to demonstrate the arrangement of the foetal tufts in the human placenta. They can be readily seen by the naked eye; and may be easily traced from their attachment at the under surface of the chorion to their termination near the uterine surface of the placenta. The anatomical disposition of the placental sinuses is, however, much more difficult of examination. During life, and while the placenta is still attached to the uterus, they are filled, of course, with the blood of the mother, and occupy fully one-half the entire mass of the placenta. But when the placenta is detached, the maternal vessels belonging to it are torn off at their necks, *c. c. c.*; and the sinuses, being then emptied of blood, collapse, and are apparently obliterated; and the foetal tufts falling together, and lying in contact with each other, appear to constitute the whole of the placental mass. The

existence of the placental sinuses, however, and their true extent, may be satisfactorily demonstrated in the following manner.

If we take the uterus of a woman who has died undelivered at the full term, or thereabouts, and open it in such a way as not to wound the placenta, this organ will be seen remaining attached to the uterine surface, with all its vascular connections complete. Let the fœtus now be removed by dividing the umbilical cord, and the uterus, with the placenta attached, placed under water with its internal surface uppermost. We then see the fœtal surface of the placenta formed by the chorion, and covered still by the thin and transparent amnion. The amnion should next be removed, which can readily be done by gently detaching it from the surface of the chorion. If the end of a blow-pipe be now introduced into one of the divided vessels of the muscular walls of the uterus, and air forced in by gentle insufflation, we can easily inflate, first the venous sinuses of the uterus itself, and next the deeper portions of the placenta; and lastly, the bubbles of air insinuate themselves everywhere between the fœtal tufts, and appear in the most superficial portions of the placenta, immediately underneath the transparent chorion. If the chorion be now divided at any point by an incision, passing merely through its own thickness, the air, which was confined beneath it in the placental sinuses, will escape, and rise in bubbles to the surface of the water. Such an experiment shows conclusively that the placental sinuses communicate freely with the uterine vessels, occupy the entire thickness of the placenta, and are equally extensive with the tufts of the fœtal chorion.

It is unnecessary to say that none of the air thus injected finds its way into the umbilical vessels.

I have now had the opportunity of doing this experiment with the results just described, on four different occasions since 1853. The first two cases occurred at Bellevue Hospital, in patients who had died of acute disease in the last stages of pregnancy. The third case was that of a woman who died undelivered, owing to hæmorrhage from placenta previa, at the end of the seventh month. The fourth was that of a woman who died of puerperal convulsions at the full term. The examinations were made at different times, in the presence of Dr. C. R. Gilman, Dr. Geo. T. Elliott, Dr. Henry B. Sands, Dr. F. J. Bumstead, Dr. Wm. H. Draper, Dr. Henry D. Noyes, Dr. T. C. Finnell, and Dr. J. W. S. Gouley, all of whom I believe were satisfied in every respect with the result of the experiment, and convinced of the existence of the placental sinuses, and of their free communication with the vessels of the uterus.

The method of injecting which I have now described has many advantages over that adopted by the Hunters and Prof. Weber.

In the first place, in order to demonstrate a doubtful anatomical point by means of injections, it is extremely desirable that the part to be injected should be freely exposed, and under the eye of the experimenter while the injection is going on. The progress of the operation can then be carefully watched, the amount of force used properly graduated, and the injection terminated as soon as the desired information has been obtained. Every one, I think, who is practically familiar with injections, will appreciate these advantages. But when the pregnant uterus is injected with wax, in the unopened condition, by the spermatic arteries or veins, the injection is made to a certain extent blindfold. We do not know when it is sufficiently complete, we cannot watch its successive stages, and any extravasations which occur may increase to any extent without being discovered. On this account, therefore, the injection by wax is both more difficult and less satisfactory than the one adopted in the above experiments.

In the second place, the injection of air in the manner above described is infinitely less liable than the other to mislead by producing extravasations. This, it will be remembered, is the great objection urged against the results obtained by Weber and the Hunters. It is said that their wax injections penetrated into the placenta by rupture of the uterine vessels, and the difference of opinion on this point shows that it is not easy to decide, from the appearance of the hardened specimen, whether the wax which has been injected be really contained in the cavity of vascular canals, or infiltrated between the tissues of the organs.

In the experiments detailed above, however, it will be recollected by those who were present, how very moderate was the force required to make the air pass from the uterus into the placenta, and even to penetrate quite up to the under surface of the chorion. The elasticity of the air, also, makes it much less likely to cause laceration of the vessels, than the liquid and incompressible wax. Furthermore, the body of the uterus being opened, in order to expose its internal surface, very many of its own vessels were necessarily divided; and the air, during its injection, bubbles out freely at numerous points from the orifices of divided uterine vessels, showing that no undue pressure can be exerted upon the walls of the vessels in its interior. In fact, no doubt can rest upon the mind after performing an injection in this manner, that the air does really follow the course of the vascular canals; and that when it penetrates into the placenta, and inflates its

entire thickness, it is still contained in natural cavities, continuous with those of the matured vessels.

Let us now see what evidence can be gathered of the anatomical arrangement just described, from the placenta as ordinarily expelled after parturition.

If the under surface of the placenta be examined after its detachment from the uterus, it will be found to present a lobulated appearance, owing to the existence of flattened rounded prominences, separated from each other by shallow furrows. Its surface is formed by a soft, whitish, opaque layer, about one-tenth of a line in thickness, which conceals from view the foetal tufts, and which is continuous, at the edges of the placenta, with the uterine decidua adhering to the external surface of the chorion. This layer is, indeed, a part of the decidua. It is the layer sometimes spoken of as "interposed" between the uterus and the placenta, though, in reality, a part of the placenta itself; and it is through it that the utero-placental vessels penetrate to expand into the placental sinuses.

These vessels penetrate, however, in such an extremely oblique direction, that their orifices may easily be overlooked; and it is on this account that it has been denied, by some authorities, that any openings are to be seen on the surface of the detached placenta, corresponding with the mouths of the lacerated uterine sinuses. These orifices, however, do exist, and may be seen by careful inspection. They are to be found more particularly in the furrows between the lobules of the placenta, and lead into the placental sinuses sometimes by a rather long and very oblique passage. They sometimes present themselves as rounded or oval openings, having but one well-defined crescentic edge, and blocked by the end of a foetal tuft, which sometimes even projects a little from the orifice, owing to the empty and collapsed condition of the maternal sinus. These openings are very numerous, also, in the terminal sinus which runs round the borders of the placenta, and from which the air easily penetrates into its central portions.

The placenta, accordingly, is a double organ, formed partly by the chorion and partly by the decidua; and consisting of maternal and foetal vessels, inextricably entangled and united with each other.



